TABLE 56.50–105—ACCEPTABLE MATERIALS AND TOUGHNESS TEST CRITERIA [2]—Continued

Product form	ASTM specification [3]	Grade [4]	Minimum service temperature	Minimum avg Charpy V notch energy
		8, 8C	No limit	Same requirement as comparable grades (B8, B8C) of bolting listed above.

[1] Quench and temper heat treatment may be permitted when specifically authorized by the Commandant. In those cases the minimum average Charpy V-notch energy shall be specially designated by the Commandant.
[2] Other material specifications for product forms acceptable under part 54 for use at low temperatures may also be used for piping systems provided the applicable toughness requirements of this Table are also met.
[3] Any repair method must be acceptable to the Commandant (G–MTH), and welding repairs as well as fabrication welding must be in accordance with part 57 of this chapter.
[4] The acceptability of several alloys for low temperature service is not intended to suggest acceptable resistance to marine corrosion. The selection of alloys for any particular shipboard location must take corrosion resistance into account and be approved by the Marine Safety Center.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 72–59R, 37 FR 6189, 6190, Mar. 25, 1972; CGD 73–254, 40 FR 40165, Sept. 2, 1975; CG 79–108, 43 FR 46545, Oct. 10, 1978; CGD 74–289, 44 FR 26008, May 3, 1979; CGD 77–140, 54 FR 40611, Oct. 2, 1989; CGD 83–043, 60 FR 24775, May 10, 1995]

§ 56.50–110 Diving support systems.

(a) In addition to the requirements of this part, piping for diving installations which is permanently installed on the vessel must meet the requirements of subpart B (Commercial Diving Operations) of part 197 of this chapter.

(b) Piping for diving installations which is not permanently installed on the vessel need not meet the requirements of this part, but must meet the requirements of subpart B of part 197 of this chapter.

(c) Piping internal to a pressure vessel for human occupancy (PVHO) need not meet the requirements of this part, but must meet the requirements of subpart B of part 197 of this chapter.

[CGD 76–009, 43 FR 53683, Nov. 16, 1978]

Subpart 56.60—Materials

§ 56.60–1 Acceptable materials and specifications (replaces 123 and Table 126.1 in ANSI–B31.1).

(a)(1) The material requirements in this subpart shall be followed in lieu of those in 123 in ANSI–B31.1.

(2) Materials used in piping systems must be selected from the specifications which appear in Table 56.60–1(a) of this section or Table 56.60–2(a) of this part, or they may be selected from the material specifications of section I, III, or VIII of the ASME Code if not prohibited by a regulation of this subchapter dealing with the particular section of the ASME Code. Table 56.60–1(a) of this section contains only pipe, tubing, and fitting specifications. Determination of acceptability of plate, forgings, bolting, nuts, and castings may be made by reference to the ASME Code as previously described. Additionally, accepted materials for use as piping system components appear in Table 56.60–2(a) of this part. Materials conforming to specifications not described in this subparagraph must receive the specific approval of the Marine Safety Center before being used. Materials listed in Table 126.1 of ANSI B31.1 are not accepted unless specifically permitted by this paragraph.

(b) Components made in accordance with the commercial standards listed in Table 56.60–1(b) of this section and made of materials complying with paragraph (a) this section may be used in piping systems within the limitations of the standards and within any further limitations specified in this subchapter.

TABLE 56.60–1(A)—ADOPTED SPECIFICATIONS AND STANDARDS (REPLACES TABLE 126.1)

NOTE: Table 56.60–1(a) identifies the acceptable pipe, tubing, and fitting specifications intended for piping system use and replaces Table 126.1 in ANSI B31.1. Piping system applications will be considered if certification of mechanical properties is furnished. Without this certification, use is limited to applications inside heat exchangers that insure containment of the material inside a pressure shell.

Pipe, seamless:		
A106 Carbon steel	ANSI–B31.1	
A335 Ferritic alloys	ANSI–B31.1	
A376 Austenitic alloys	ANSI–B31.1	(1).
Pipe, seamless and welded:		
A53 Types S, F, and E steel pipe	ANSI–B31.1	(2, 3, 4).
A312 Austenitic steel (welded with no filler metal)	ANSI–B31.1	(1, 4).
A333 Low temperature steel pipe	Sec. VIII, ASME Code	(5).
Pipe, welded:		
A134 Fusion welded steel plate pipe	See footnote 7	(7).
A135 ERW pipe	ANSI–B31.1	(3).
A139 Grade B only, fusion welded steel pipe	ANSI–B31.1	(8).
A358 Electric fusion welded pipe, high temperature, austenitic.	ANSI–B31.1	(1, 4, 9).
Pipe, forged and bored:		
A369 Ferritic alloy	ANSI–B31.1	
A430 Austenitic alloy	ANSI–B31.1	(1).
Pipe, centrifugally cast:	(None applicable)	(19)
Tube, seamless:		
A179 Carbon steel heat exchanger and condenser tubes.	UCS23, Sec. VIII, ASME Code	(11).
A192 Carbon steel boiler tubes	PG23.1, Sec. I, ASME Code	(10).
A199 Alloy steel condenser tubes	UCS23, Sec. VIII, ASME Code	
A210 Medium carbon boiler tubes	PG23.1, Sec. I, ASME Code	
A213 Ferritic and austenitic boiler tubes	PG23.1, Sec. I, ASME Code	(1).
Tube, seamless and welded:		
A268 Seamless and ERW ferritic stainless tubing	PG23.1, Sec. I, ASME Code	(4).
A334 Seamless and welded (no added filler metal) carbon and low alloy tubing for low temperature.	UCS23, Sec. VIII, ASME Code	(4, 5).
Tube, welded:		
A178 (Grades A and C only) ERW boiler tubes	PG23.1, Sec. I, ASME Code	(10 Grade A) (4).
A214 ERW heat exchanger and condenser tubes	UCS27, Sec. VIII, ASME Code	
A226 ERW boiler and superheater tubes	PG23.1, Sec. I, ASME Code	(4, 10).
A249 Welded austenitic boiler and heat exchanger tubes (no added filler metal).	PG23.1, Sec. I, ASME Code	(1, 4).
Wrought fittings (factory made):		
A234 Carbon and ferritic alloys	Conforms to applicable American National Standards (ANSI–B16.9 and ANSI–B16.11).	(12).
A403 Austenitic alloys	.....do	(12).
A420 Low temperature carbon and steel alloy	.....do	(12).
Castings,[13] iron:		
A47 Malleable iron	Conform to applicable American National Standards or refer to UCI–23 or UCD–23, Sec. VIII, ASME Code.	(14).
A126 Gray iron	.....do	(14).
A197 Malleable iron	.....do	(14).
A395 Ductile iron	UCD–23, Sec. VIII, ASME Code	(14).
A536 Ductile iron	See footnote 20	(20).

NONFERROUS MATERIALS[15]

Pipe, seamless:		
B42 Copper	UNF23, Sec. VIII, ASME Code	(16).
B43 Red brass	.....do	
B241 Aluminum alloy	.....do	
Pipe and tube, seamless:		
B161 Nickel	.....do	
B165 Nickel-copper	.....do	
B167 Ni-Cr-Fe	.....do	
B315 Copper-silicon	.....do	
Tube, seamless:		
B68 Copper	See footnote 17	(16, 17, 18).
B75 Copper	UNF23, Sec. VIII, ASME Code	(16).
B88 Copper	See footnote 17	(16, 17).
B111 Copper and copper alloy	UNF23, Sec. VIII, ASME Code	
B210 Aluminum alloy, drawn	.....do	

TABLE 56.60–1(A)—ADOPTED SPECIFICATIONS AND STANDARDS (REPLACES TABLE 126.1)—Continued

NOTE: Table 56.60–1(a) identifies the acceptable pipe, tubing, and fitting specifications intended for piping system use and replaces Table 126.1 in ANSI B31.1. Piping system applications will be considered if certification of mechanical properties is furnished. Without this certification, use is limited to applications inside heat exchangers that insure containment of the material inside a pressure shell.

B234 Aluminum alloy, drawn	.....do	
B280 Copper tube for refrigeration service	See footnote 17	[16, 17].
Welding fittings:		
B361 Wrought aluminum welding fittings	Shall meet ANSI Standards	

ASTM specification	Minimum tensile	Longitudinal joint efficiency	P No.	Allowable stresses (p.s.i.)
A134:				
Grade 285A	45,000	0.80	1	11,250×0,8=9,000.
Grade 285B	50,000	0.80	1	12,500×0,8=10,000.
Grade 285C	55,000	0.80	1	13,750×0,8=11,000.

NOTE: When using 104.1.2 in ANSI–B31.1 to compute wall thickness, the stress shown here shall be applied as though taken from the stress tables. An additional factor of 0.8 may be required by § 56.07–10(c) and (e).

[1] For austenitic materials where two sets of stresses appear, use the lower values.
[2] Type F (Furnace welded, using open hearth, basic oxygen, or electric furnace only) limited to Class II applications with a maximum service temperature of 450 °F. Type E (ERW grade) limited to maximum service temperature of 650 °F, or less.
[3] Electric resistance welded pipe or tubing of this specification may be used to a maximum design pressure of 350 pounds per square inch gage.
[4] Refer to limitations on use of welded grades given in § 56.60–2(b).
[5] Use generally considered for Classes I–L and II–L applications. For Class I–L service only, the seamless grade is permitted. For other service refer to footnote 4 and to § 56.50–105.
[6] Furnace lap or furnace butt grades only. Limited to Class II applications only where the maximum service temperature is 450 °F, or less.
[7] Limited to Grades 285A, 285B, and 285C only (straight and spiral seam). Limited to Class II applications only where maximum service temperature is 300 °F or less for straight seam, and 200 °F or less for spiral seam.
[8] Limited to Class II applications where the maximum service temperature is 300 °F or less for straight seam and 200 °F or less for spiral seam.
[9] For Class I applications only the Class I Grade of the specification may be used.
[10] When used in piping systems, a certificate shall be furnished by the manufacturer certifying that the mechanical properties at room temperature specified in ASTM A520 have been met. Without this certification, use is limited to applications within heat exchangers.
[11] When used in piping systems, a certificate shall be furnished by the manufacturer certifying that the mechanical properties for A192 in ASTM A520 have been met. Without this certification, use is limited to applications within heat exchangers.
[12] Hydrostatic testing of these fittings is not required but all fittings shall be capable of withstanding without failure, leakage, or impairment of serviceability, a hydrostatic test of 1½ times the designated rating pressure.
[13] Other acceptable iron castings are in UCI–23 and UCD–23 of section VIII of the ASME Code. (See also §§ 56.60–10 and 56.60–15.) Acceptable castings of materials other than cast iron may be found in section I or VIII of the ASME Code.
[14] Acceptable when complying with American National Standards. Ductile iron is acceptable for temperatures not exceeding 650 °F. For pressure temperature limitations refer to UCD–3 of section VIII of the ASME Code. Other grades of cast iron are acceptable for temperatures not exceeding 450 °F. For pressure temperature limitations refer to UCI–3 of section VIII of the ASME Code.
[15] For limitations in use refer to §§ 56.10–5(c) and 56.60–20.
[16] Copper pipe must not be used for hot oil systems except for short flexible connections at burners. Copper pipe must be annealed before installation in Class I piping systems. See also §§ 56.10–5(c) and 56.60–20.
[17] The stress values shall be taken from UNF23 of section VIII of the ASME Code for B75 annealed and light drawn temper as appropriate.
[18] B68 shall be acceptable if provided with a mill hydrostatic or eddy current test.
[19] Centrifugally cast pipe must be specifically approved by the Marine Safety Center.
[20] Limited to pipe fittings and valves. See § 56.60–15(d) for additional information.

TABLE 56.60–1(B)—ADOPTED STANDARDS APPLICABLE TO PIPING SYSTEMS (REPLACES TABLE 126.1)

ANSI Standards (American National Standards Institute), 11 West 42nd Street, New York, NY 10036.

B1.1	Unified Screw Threads.
B1.20.1 ..	Pipe Threads, General Purpose.
B1.20.3 ..	Dryseal Pipe Threads.
B2.1	Pipe Threads.
B2.2	[Reserved]
B16.1	C.I. Flanges and Fittings—Classes 125 and 250 Only.
B16.3	M.I. Threaded Fittings—Classes 150 and 300.
B16.4	C.I. Threaded Fittings—Classes 125 and 250.
B16.5	Steel Pipe Flanges and Flanged Fittings.[3]
B16.9	Steel Buttwelding Fittings.[3]

TABLE 56.60–1(B)—ADOPTED STANDARDS APPLICABLE TO PIPING SYSTEMS (REPLACES TABLE 126.1)—Continued

B16.10 ...	Dimensions of Ferrous Valves.
B16.11 ...	Steel S.W. and Threaded Fittings.
B16.14 ...	Ferrous-Threaded Plugs, Bushings and Locknuts.[4]
B16.15 ...	Cast Bronze Threaded Fittings—Classes 125 & 250.[4]
B16.18 ...	Cast Copper Alloy Solder Joints.[4]
B16.20 ...	Ring Joint Gaskets—Steel Flanges.
B16.21 ...	Non-metallic Gaskets for Flanges.
B16.22 ...	Wrought Copper and Copper Alloy Solder Joint Fittings.[4]
B16.23 ...	Cast Copper Alloy Solder-Joint Drainage Fittings.[4]

TABLE 56.60–1(B)—ADOPTED STANDARDS APPLICABLE TO PIPING SYSTEMS (REPLACES TABLE 126.1)—Continued

B16.24 ...	Bronze Pipe Flanges and Flanged Fittings—Class 150 and 300.[3]
B16.25 ...	Butt Welding Ends—Pipe, Valves, Flanges, & Fittings.
B16.28 ...	Wrought Steel Buttwelding Short Radius Elbows and Returns.[4]
B16.29 ...	Wrought Copper and Wrought-Copper Alloy Solder Joint Drainage Fittings.[4]
B16.34 ...	Valves—Flanged, Threaded and Welding end.[3]
B16.42 ...	Ductile Iron Pipe Flanges and Fittings.[3]
B18.2	[Reserved]
B18.2.1 ..	Square and Hex Bolts and Screws, Inch series.
B18.2.2 ..	Square and Hex Nuts.
ASTM Standards (American Society for Testing and Materials), 100 Barr Harbor Drive, Conshohocken, PA 19428—2959.	
F682	Wrought Carbon Steel Sleeve-Type Couplings.
F1006	Entrainment Separators for Use in Marine Piping Applications.[4]
F1007	Pipe Line Expansion Joints of the Packed Slip Type for Marine Applications.
F1020	Line Blind Valves for Marine Applications.[4]
F1120	Circular Metallic Bellows Type Expansion Joints.
F1123	Non-Metallic Expansion Joints.
F1139	Steam Traps and Drains.
F1172	Fuel Oil Meters of the Volumetric Positive Displacement Type.
F1173	Epoxy Resin Fiberglass Pipe and Fittings to be Used for Marine Applications.
F1199	Cast and Welded Pipe Line Strainers.
F1200	Fabricated (Welded) Pipe Line Strainers.
F1201	Fluid Conditioner Fittings in Piping Applications Above 0 °F.
EJMA Standards (Expansion Joint Manufacturers Association, Inc.), 25 North Broadway, Tarrytown, NY 10591	
Standards of the Expansion Joint Manufacturers Association, Inc.	
FCI Standards (Fluid Controls Institute, Inc.), 31 South Street, Suite 303, Morristown, NJ 07960.	
FCI 69–1	Pressure Rating Standard for Steam Traps.[4]
MSS Standards (Manufacturers' Standardization Society of the Valve and Fittings Industry), 127 Park Street NE, Vienna, VA 22180.	
B36.10 ...	Wrought-Steel & Iron Pipe.
B36.19 ...	Stainless Steel Pipe.
MSS Standards (Manufacturers' Standardization Society of the Valve and Fittings Industry), 1815 North Fort Myer Drive, Arlington, Va. 22209.	
SP–6	Finishes-On Flanges, Valves & Fittings.
SP–9	Spot-Facing.
SP–25	Standard Marking System for Valves, Fittings, Flanges and Unions.
SP–37	[Reserved]
SP–42	[Reserved]
SP–44	Steel Pipe Line Flanges.[4]
SP–45	Bypass and Drain Connection.
SP–51	Class 150LW Corrosion Resistant Cast Flanges and Flanged Fittings.[4]
SP–53	Magnetic Particle Inspection—Steel Castings.
SP–55	Visual Inspection—Steel Castings.
SP–58	Pipe Hangers & Supports.
SP–61	Hydrostatic Testing Steel Valves.

TABLE 56.60–1(B)—ADOPTED STANDARDS APPLICABLE TO PIPING SYSTEMS (REPLACES TABLE 126.1)—Continued

SP–66	[Reserved]
SP–67	Butterfly Valves.[2] [4]
SP–69	Pipe Hangers and Supports—Selection and Application.
SP–72	Ball Valves with Flanged or Butt-Welding Ends for General Service.[4]
SP–73	Silver Brazing Joints for Wrought and Cast Solder Joint Fittings.
SP–83	Carbon Steel Pipe Unions Socket-Welding and Threaded.

[1] [Reserved]

[2] In addition, for bronze valves, adequacy of body shell thickness shall be satisfactory to the Marine Safety Center. Refer to § 56.60–10 of this part for cast iron valves.

[3] Mill or manufacturer's certification is not required, except where a needed portion of the required marking is deleted due to size or is absent due to age of existing stocks.

[4] Because this standard offers the option of several materials, some of which are not generally acceptable to the Coast Guard, compliance with the standard does not necessarily indicate compliance with these regulations. The marking on the component or the manufacturer or mill certificate must indicate the material specification and/or grade as necessary to fully identify the materials used. The material used must comply with the requirements in this subchapter relating to the particular application.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGFR 72–59R, 37 FR 6190, Mar. 25, 1972; CGD 72–206R, 38 FR 17229, June 29, 1973; CGD 73–248, 39 FR 30839, Aug. 26, 1974; CGD 73–254, 40 FR 40165, Sept. 2, 1975; CGD 77–140, 54 FR 40611, Oct. 2, 1989; 55 FR 39968, 39969, Oct. 1, 1990; CGD 95–027, 61 FR 26001, May 23, 1996; USCG–1999–6216, 64 FR 53224, Oct. 1, 1999]

§ 56.60–2 Limitations on materials.

Welded pipe and tubing. The following restrictions apply to the use of welded pipe and tubing specifications when utilized in piping systems, and not when utilized in heat exchanger, boiler, pressure vessel, or similar components:

(a) *Longitudinal joint.* Wherever possible, the longitudinal joint of a welded pipe shall not be pierced with holes for branch connections or other purposes.

(b) *Class II.* Use unlimited except as restricted by maximum temperature or pressure specified in Table 56.60–1(a) or by the requirements contained in § 56.10–5(b) of this chapter.

(c) *Class I.* (1) For those specifications in which a filler metal is used, the following applies to the material as furnished prior to any fabrication:

(i) For use in service above 800 °F. full welding procedure qualifications by the Coast Guard are required. See part 57 of this subchapter.

(ii) Ultrasonic examination as required by item S–6 in ASTM A–376 shall be certified as having been met in all